

ONTARIO. MINISTRY OF THE ENVIRONMENT

Moss exposure surveys in the vicinity of
Domtar Packing, RED ROCK.

1983-1984

// MOSS EXPOSURE SURVEYS
in the vicinity of
DOMTAR PACKING, RED ROCK

1983 AND 1984

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INTRODUCTION

Ministry of the Environment studies in 1977 and 1978 at Red Rock revealed that calcium and sodium were significantly elevated in snow and in moss exposed near the Domtar Packaging Limited pulp mill (1, 2). Domtar installed a new recovery boiler in October, 1982. In January, 1983, a wet scrubber was added to the No. 2 lime kiln. To document the effects of these pollution controls, we conducted a moss exposure study during the summer of 1983. At the time of this survey, the No. 2 lime kiln was down for maintenance and the No. 1 kiln, which lacks air pollution control devices, was in operation. During our 1984 survey, the No. 2 kiln was in continuous use and the No. 1 kiln was shut down.

METHODS

Sphagnum moss bags were exposed from June 2 to July 18, 1983, and from June 11 to July 16, 1984 at the same sampling sites used in the 1977 survey (Figure 1). Following the exposure periods, the moss samples were submitted to the Ministry's Thunder Bay laboratory for calcium and sodium analysis, and to the Ministry's Toronto laboratory for chloride and sulphur analysis. Standard Ministry sampling, sample processing and analytical procedures were followed (3, 4, 5).

Proposed contaminant guidelines developed by the Ministry for moss exposure studies are used in this report. Their exceedance suggests that contamination may be present but does not necessarily imply adverse effects.

RESULTS

Chemical analysis results from the 1977, 1983 and 1984 surveys are summarized in Table 1. Off company property, chloride exceeded the Ministry guideline only in 1977, at one site. There were elevated sulphur concentrations at two off-property locations in 1983 but none in 1984. Sulphur was not analysed in 1977. Sodium levels in moss at townsite exposure locations declined sharply from 1977 to 1983 and 1984 as shown in Figures 2a, 2b and 2c. In 1984, all off-property sodium concentrations met the guideline. This achievement is attributed to greatly reduced saltcake emissions from a new recovery boiler installed at the mill in 1982. The beneficial effects of this abatement action are also shown by Ministry dustfall data for 1983 and 1984 (6, 7).

Because the background levels of calcium in moss in 1983 and 1984 surveys were much higher than that in 1977, the calcium data were difficult to evaluate. In 1984, calcium concentrations at all off-property sites were only slightly above background levels, and were, on average, a little lower than values recorded at the same locations in 1983. Calcium is present in high and often variable levels in plants. For this reason, its concentrations in moss may not be a reliable indicator of airborne calcium levels. At present, there is no guideline for calcium in moss.

CONCLUSIONS

The 1984 moss exposure study around Domtar's kraft pulp mill in Red Rock showed that off-property levels of chloride, sodium and sulphur met Ministry guidelines. Compared with 1977, sodium showed the greatest decrease. This improvement followed the installation of a new recovery furnace at the mill in 1982. Calcium concentrations, though difficult to evaluate, indicated that calcium fallout in the townsite is not a problem.

REFERENCES

1. Racette, D. J. and H. D. Griffin. 1977. Snow sampling study, Red Rock, February, 1977. Ontario Ministry of the Environment.
2. Griffin, H. D. and D. J. Racette. 1978. Moss bag exposure (1977) and snow sampling studies (1978) in the vicinity of Domtar Packaging Limited, Red Rock. Ontario Ministry of the Environment.
3. Ontario Ministry of the Environment. 1983. Field investigation procedures manual. Phytotoxicology Section, Air Resources Branch.
4. Ontario Ministry of the Environment. 1981. Outlines of analytical methods, Laboratory Services Branch.
5. Temple, P. J., D. L. McLaughlin, S. N. Linzon, R. Wills. 1981. Moss bags as monitors of atmospheric deposition. Journal of the Air Pollution Control Association. Vol. 31, No. 6, pp 668-670.
6. Griffin, H. D. 1984. Air quality, northwestern Ontario. Annual Report, 1983. Ontario Ministry of the Environment.
7. Griffin, H. D. 1985. Air quality, northwestern Ontario. Annual Report, 1984. Ontario Ministry of the Environment.

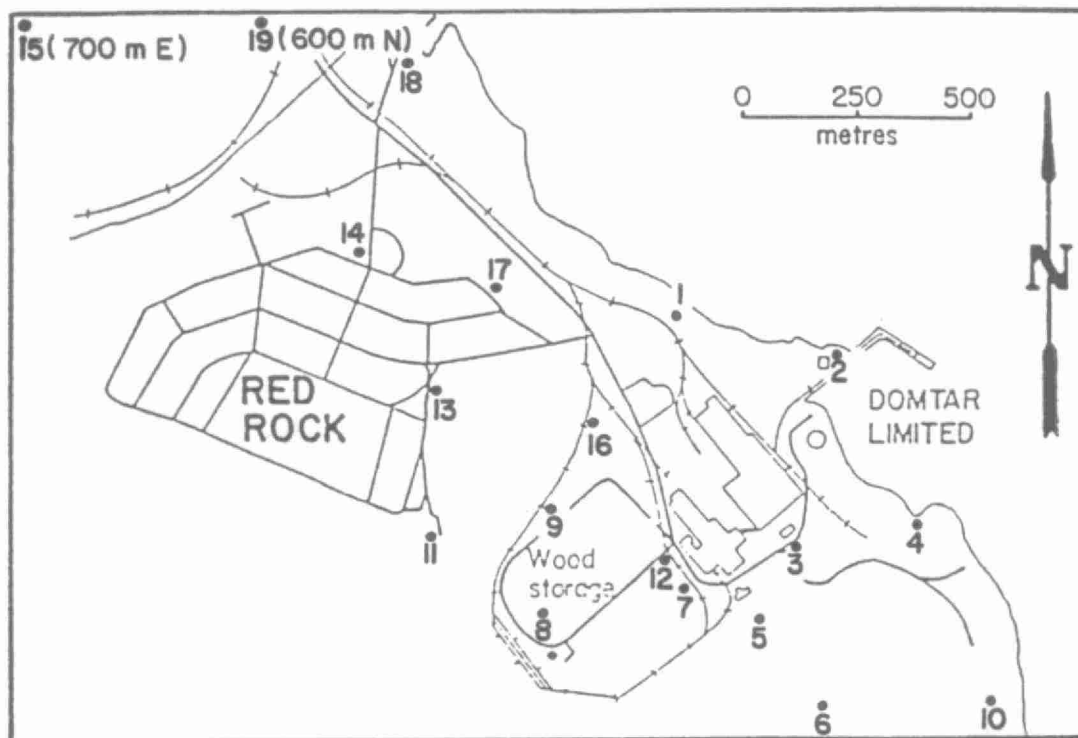


Figure 1. Moss bag exposure sites, Red Rock, 1977, 1983, 1984.

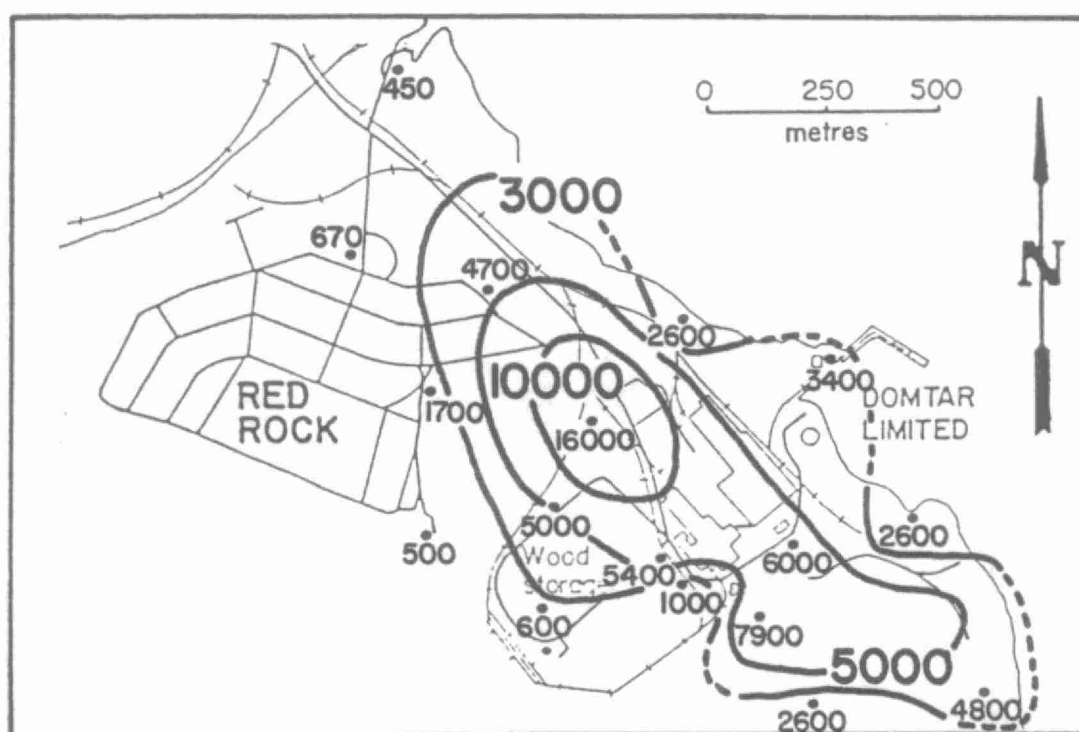


Figure 2a. Levels of sodium ($\mu\text{g/g}$, dry weight) in moss exposed July 12 to August 17, 1977.

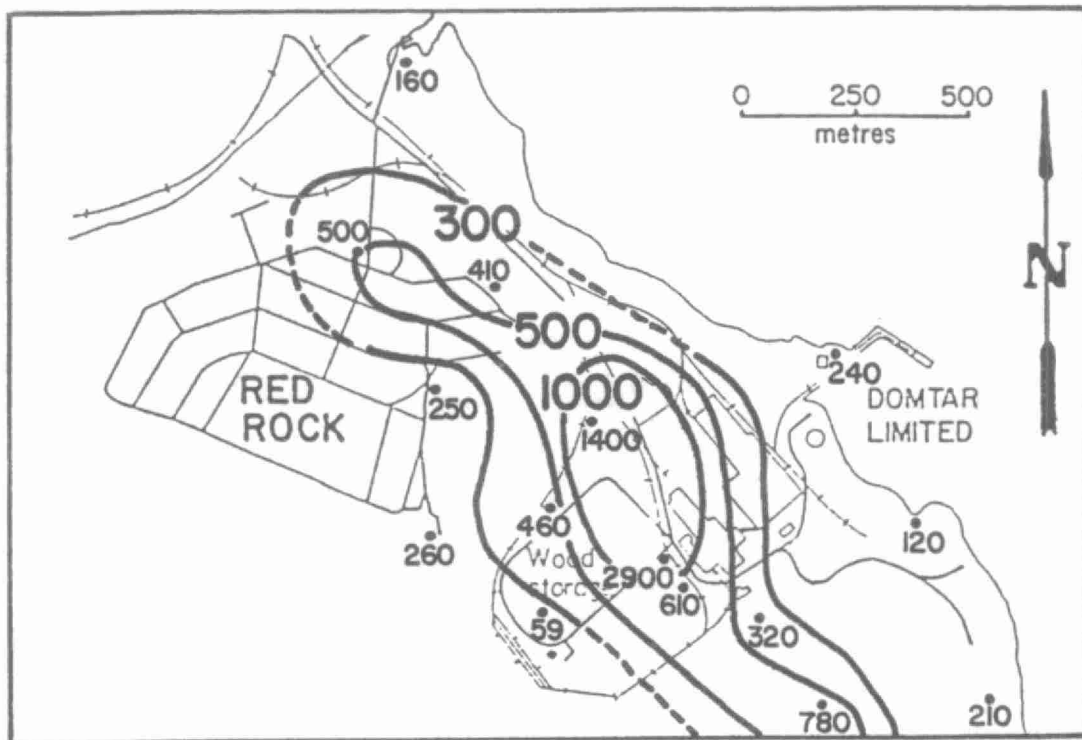


Figure 2b. Levels of sodium ($\mu\text{g/g}$, dry weight) in moss exposed June 2 to July 18, 1983.

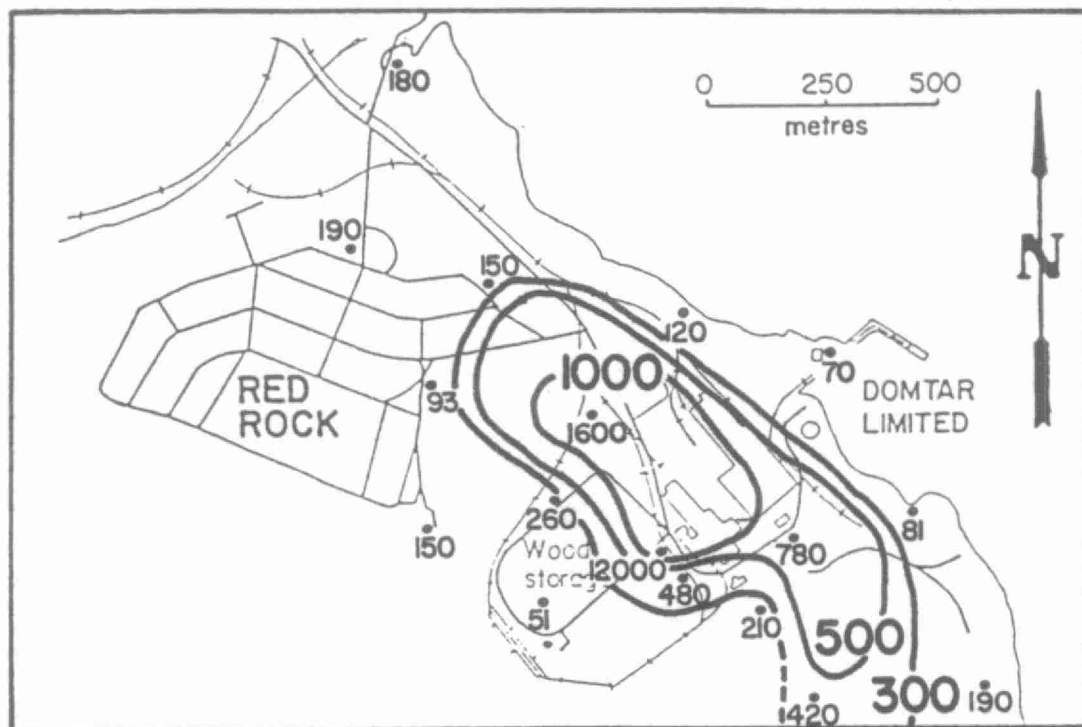


Figure 2c. Levels of sodium ($\mu\text{g/g}$, dry weight) in moss exposed June 11 to July 16, 1984.

TABLE 1. Comparison between levels of calcium, chloride, sodium and sulphur ($\mu\text{g/g}$, dry weight) in moss bags exposed July 12 to August 17, 1977, June 2 to July 18, 1983, and June 11 to July 16, 1984.

Site	Calcium			Chloride			Sodium			Sulphur	
	1977	1983	1984	1977	1983	1984	1977	1983	1984	1983	1984
1	2200	-	8900	300	-	200	2600	-	120	-	600
2	2700	7500	8700	300	<100	<100	3400	240	70	600	500
3	3500	-	12000	400	-	2000	6000	-	780	-	1400
4	4000	8100	8100	200	<100	<100	2600	120	81	700	500
5	2200	9800	9100	300	<100	100	7500	320	210	800	500
6	2400	11000	11000	200	<100	100	2600	780	420	1000	800
7	3700	9400	9300	100	<100	<100	1000	610	480	800	900
8	3000	7000	6800	100	<100	<100	600	59	51	500	500
9	1900	12000	8100	300	<100	<100	5000	460	260	1200	500
10	3400	6700	8800	300	<100	100	4800	210	190	600	500
11	2300	8500	6800	100	<100	<100	500	260	150	600	600
12	1000	17000	14000	300	100	400	5400	2900	12000	2100	7400
13	1900	8200	7500	100	<100	<100	1700	250	93	900	600
14	2100	12000	9000	100	300	100	670	500	190	1200	700
15	1900	6200	6900	100	100	<100	1600	100	30	700	400
16	2700	35000	17000	600	<100	100	16000	1400	1600	4400	2100
17	1700	18000	9900	500	<100	<100	4700	410	150	2100	600
18	2000	7000	7800	100	<100	300	450	160	180	700	1000
19	2100	6000	7100	100	<100	<100	260	52	<25	600	500
Exposed controls	2200	6000	6800	100	<100	<100	100	54	54	600	500
Unexposed controls	2100	6200	6800	<100	<100	100	64	35	<25	200	500
Guidelines ^a					300			250		1000	

^aGuidelines are based on a 30 day exposure period.

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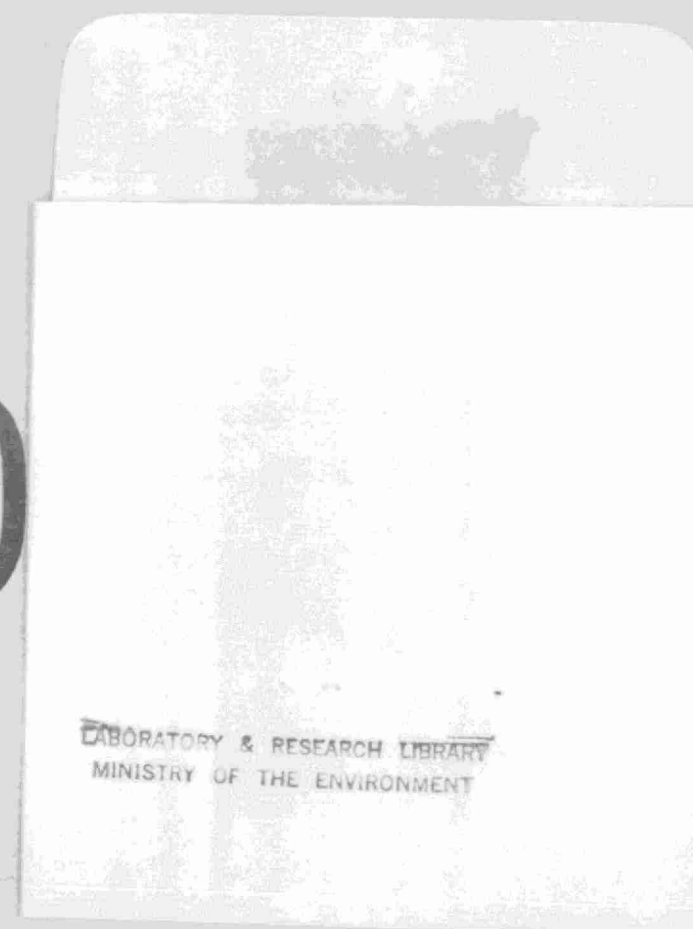
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